MOUNT ZION CHURCH
LEESBURG, VIRGINIA

PRELIMINARY STRUCTURAL EVALUATION
OF REAR WALL DISTRESS

DECEMBER 5, 1996

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December 5, 1996

Mr. Donald J. Musch
MZCPA Board
Mount Zion Church Preservation Association, Inc.
Box 15
Leesburg, Virginia 22075-0015

Re: Mt. Zion Church
Preliminary Structural Evaluation
of Rear Wall Distress
96223.

Dear Mr. Musch;

The purpose of our visit to the Mt. Zion Church and our analysis of the current structural stability of the rear wall of the property is to address not only the issues concerning the existing conditions but also to alleviate any anxieties that the tilted wall may have created on the Association Members.

Our findings could be expressed best if we first try to explain what may have caused the existing conditions. (Please refer to drawing 1 of 5).

Exterior side walls on structures dating to the original construction of this building were constructed on stone foundation walls. The stone foundation walls being wider than the walls above. The loads imposed on the outside face of these foundation walls coming from the roof and balcony framing plus the weight of the wall were partially balanced by the floor framing loads acting on the inside face of the foundation walls.

We must also note that seldom if ever were footings installed under these walls. The normal construction sequence was one of excavating a trench until the ground "looked good" and then starting the foundation wall by placing some rows of flatter stones. The net result being walls partially balanced which could be damaged by erosion, animal borrows, heaving, etc. What saved most of these "old" structures, was that foundation trenches were usually excavated to three or four feet below grade. (Please refer to drawing 2 of 5).

End walls on these buildings did not enjoy the benefits of a floor loading from the inside balancing the eccentric loads generated by the exterior walls, thus it is quite common to find rotating end walls associated with these structures.

In the case of the Mt. Zion Church, these facts associated with poor drainage, a change in width of the end wall, (8" to 12"), and the fact that the stone foundation walls were always built wider than the supported brick walls, and were most of the time built flush with the upper brick walls, have created an extraordinarily large eccentric loading on the footing.

This eccentricity has caused rotational settlement of the foundation wall which is causing the upper supported brick wall to bulge outwards. This process will never stop and will continue to increase unless remedial action is undertaken, (See 3 of 5).

It must be understood we are performing this "pro bono" preliminary assessment on this structure devoid of the benefit of drawings, plans, any geotechnical information, or the advantage of a forensic exploration based on a partial excavation of a test pit next to the affected walls in order to verify sizes, depth of the foundation, dimensions, soil bearing capacity, computation of loads, etc.

However in order to provide the Preservation Association with a preliminary directive, we have prepared the following suggestions on a plan of action:

1) Within the next six months, provide a temporary wood brace at mid-span of the exterior end wall (West wall), (See Detail 4 of 5).

2) Perform a thorough structural investigation within the next two years including forensic excavations to determine the best and most economical method to provide the end wall with a new underpinning concrete foundation. A "strong back" reinforcement of the end wall is strongly suggested, (See Detail 5 of 5).

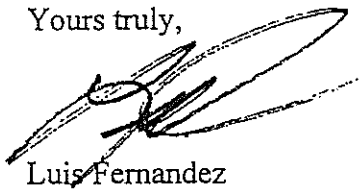
3) Remove temporary wood wall brace after end wall has been underpinned and "strong back" has been installed.

This report has been prepared for the benefit and guidance of the Mount Zion Church Preservation Association and is based on visual observations and estimated conditions based on previous experience on similar structures and may or may not represent all actual existing conditions or causes associated with the bulging of the end wall.

If no action or repairs are implemented the end wall of this structure will continue to deform outwards.

For the near term and based on our recent field inspection, the wall has not yet reached the point of imminent collapse.

Yours truly,



Luis Fernandez

encl: Sheets 1 of 5 thru 5 of 5.

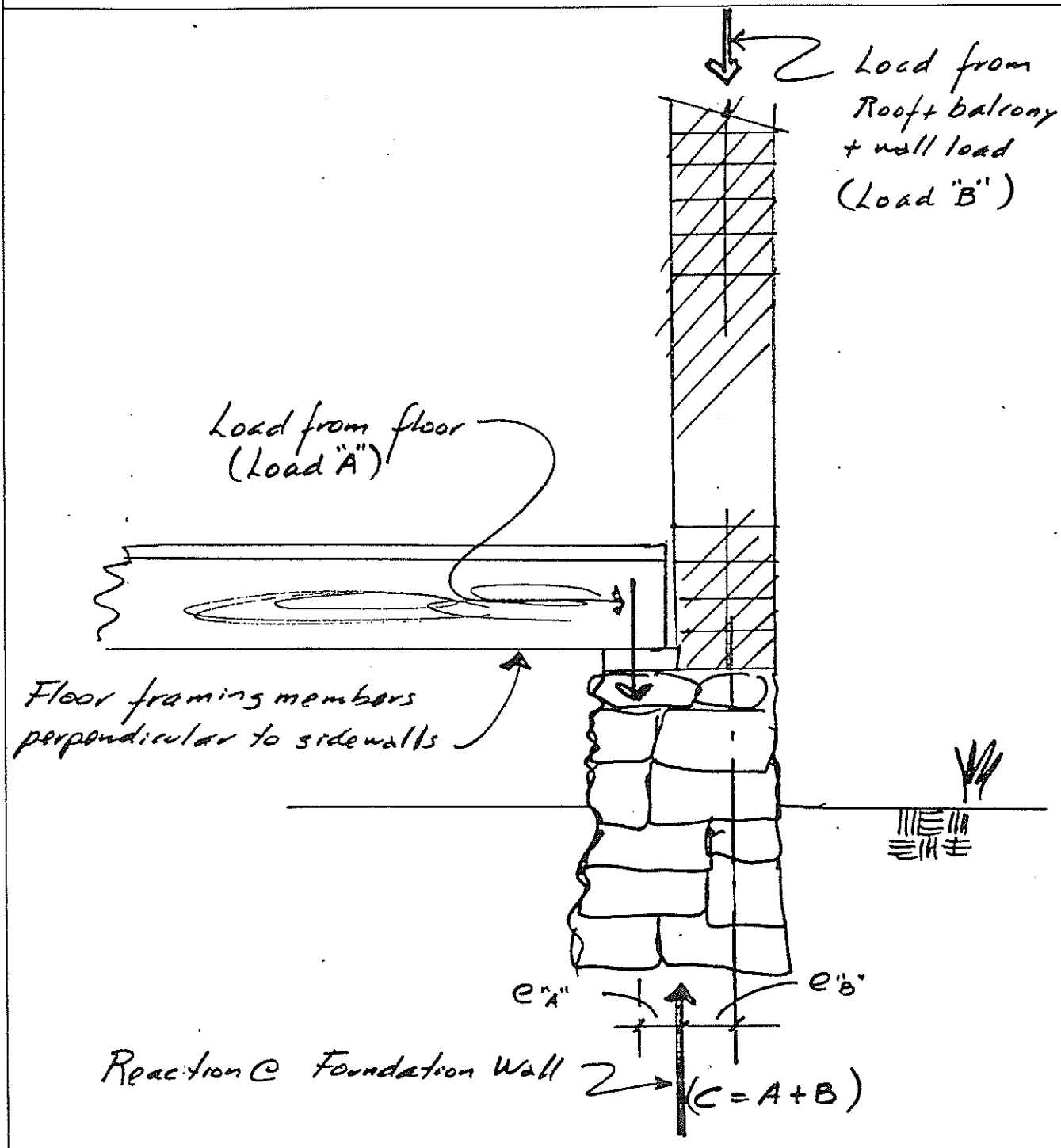
PROJECT M+ Zion Church SHEET 1 OF 5

SUBJECT Probable Section thru Side Wall. DATE 12/96

BY LF

F&A PROJECT No. 96223

CLIENT PROJECT No. _____



Section thru Side-Wall

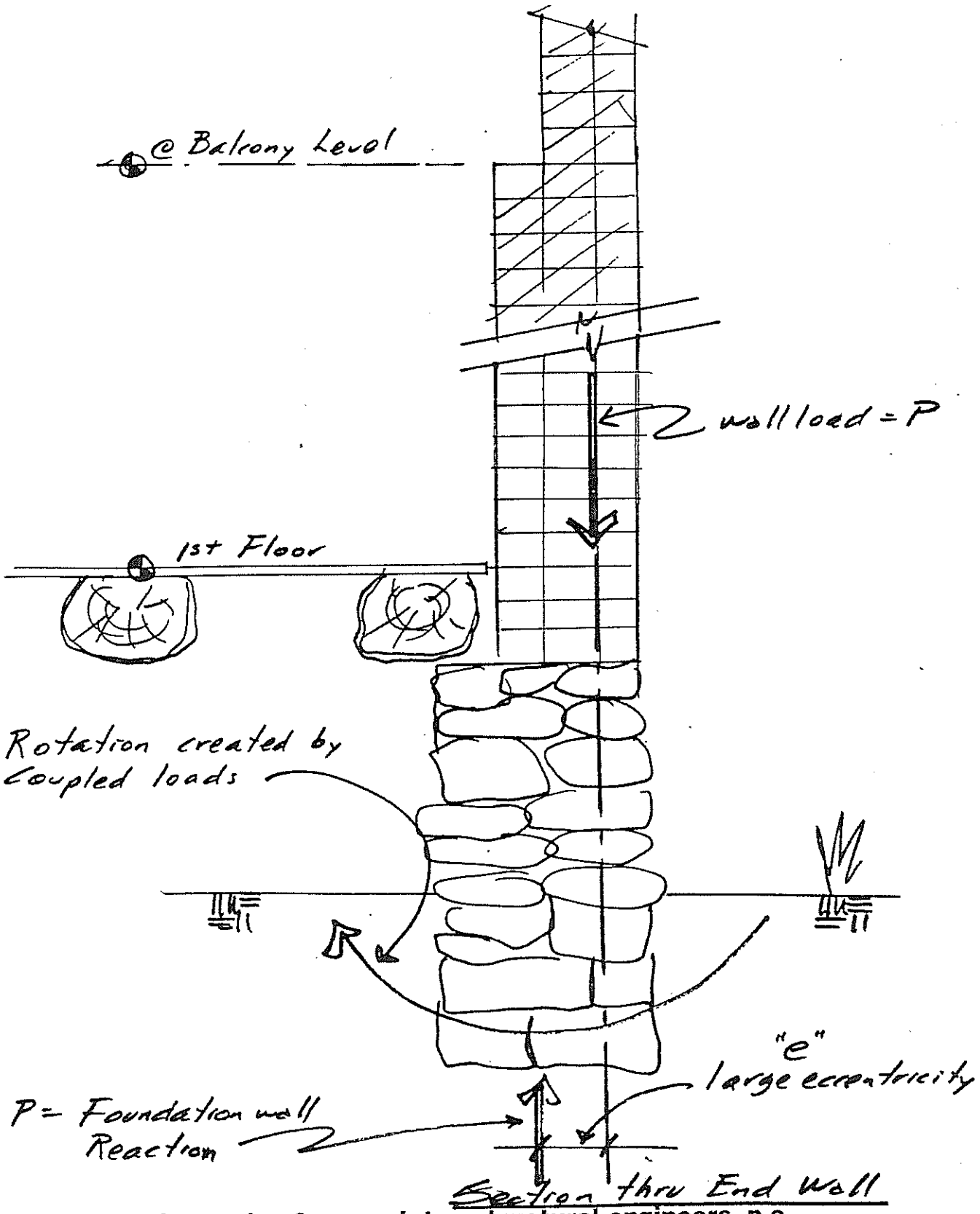
PROJECT M^t Zion Church SHEET 2 OF 5

SUBJECT Probable Section thru End wall. DATE 12/96

BY LF

F&A PROJECT No. 96223

CLIENT PROJECT No. _____



Section thru End Wall

PROJECT Mt Zion Church SHEET 3 OF 5

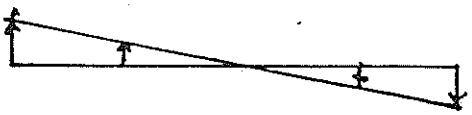
SUBJECT Stress distribution on Soils @ end wall DATE 12/96

BY LF

F&A PROJECT No. 96223

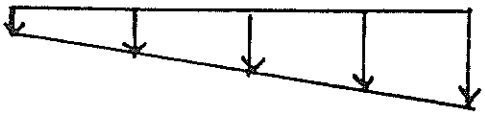
CLIENT PROJECT No.

$f_a = P/A$ Stress due to Vertical Load



Stress distribution due to Couple Loads

$f_b = \frac{\pm M}{S} = Pxe$



Less settlement

Combined final load on Soils under foundation wall

Greatest settlement due to Consolidation based on larger load

Stress Distribution

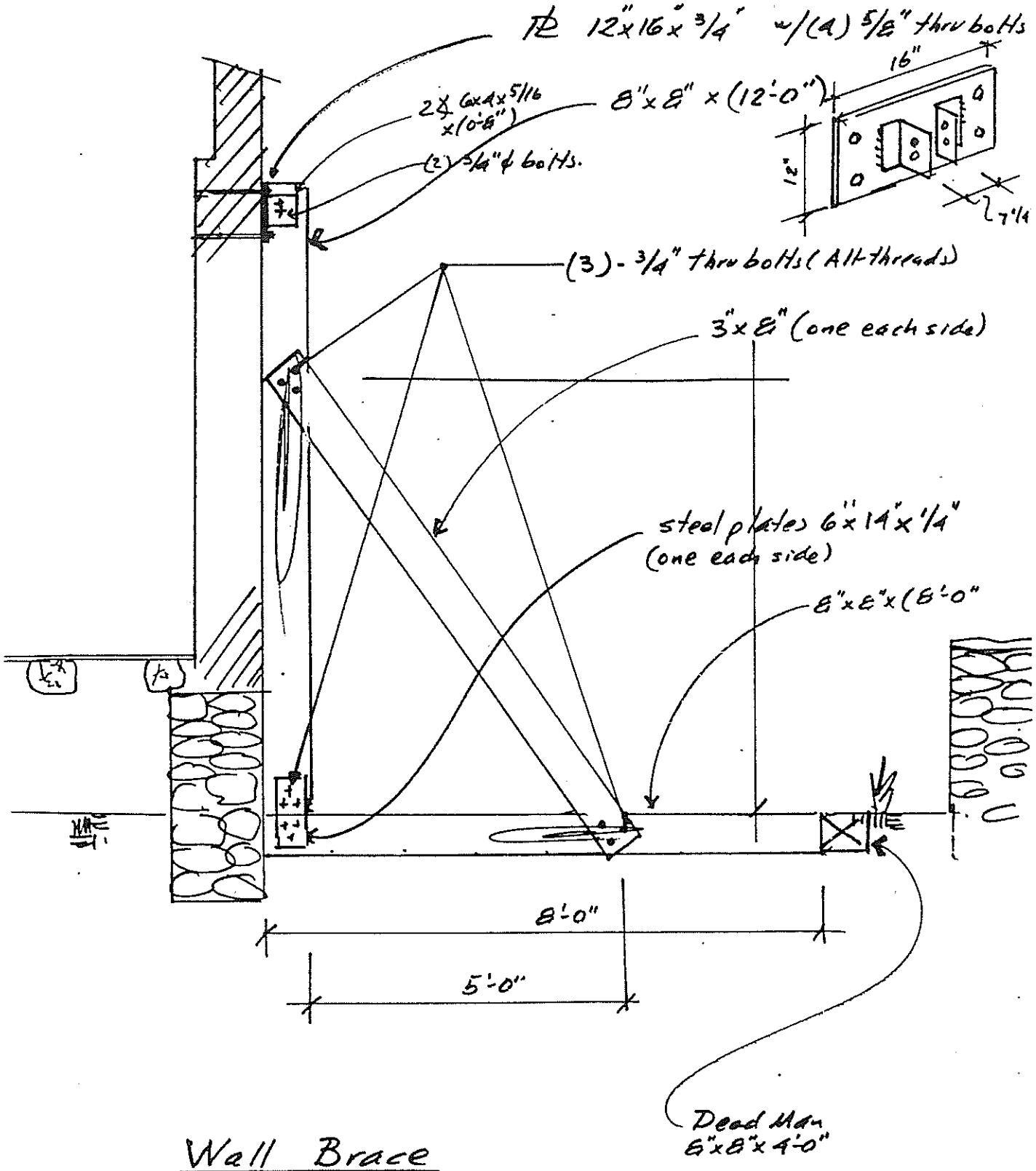
PROJECT Mt Zion Church SHEET 4 OF 5

SUBJECT Proposed Temporary Wood Brace. DATE 12/96

BY LF

F&A PROJECT No. 96223

CLIENT PROJECT No.



Wall Brace

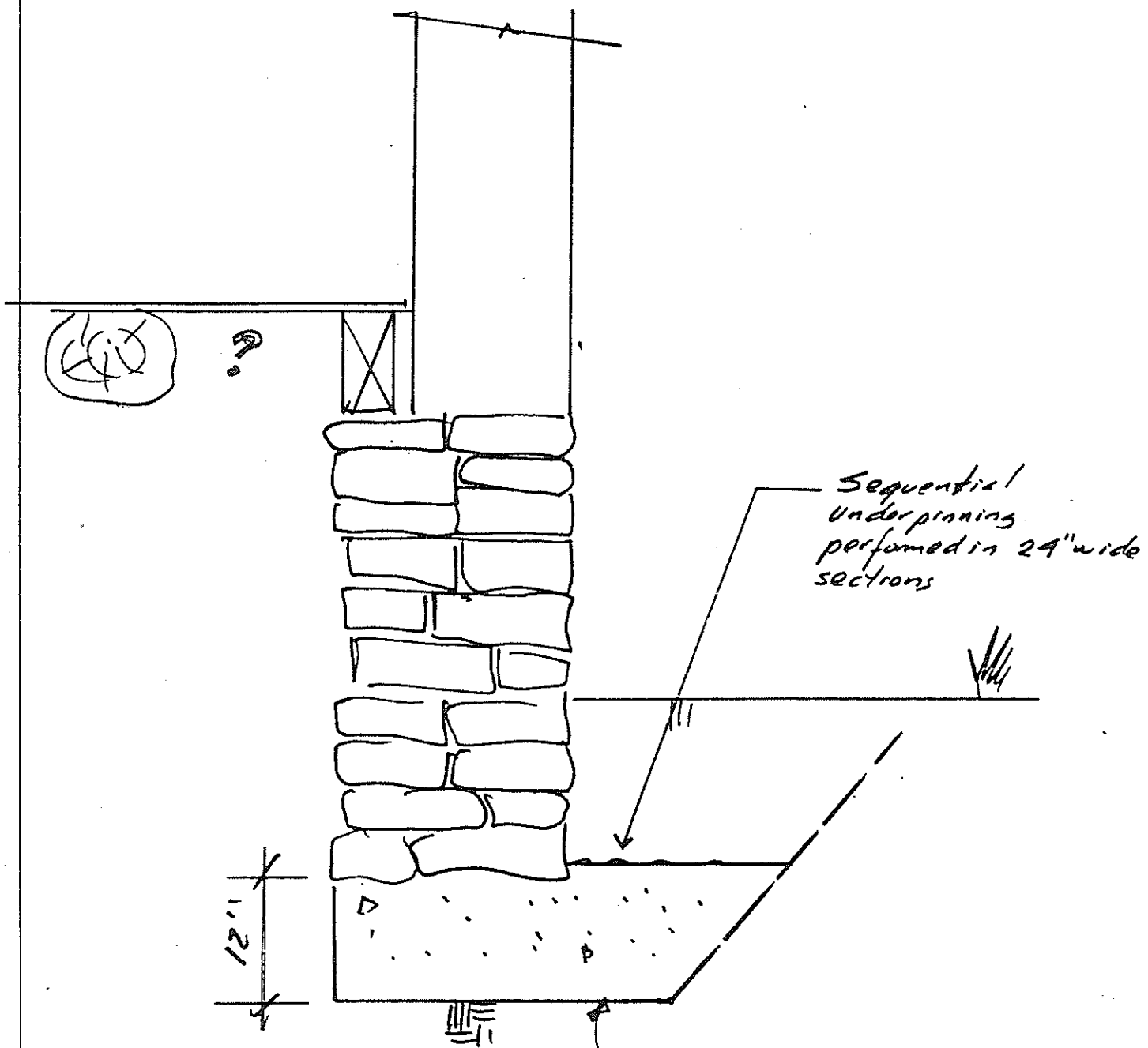
PROJECT Mt Zion Church SHEET 5 OF 5

SUBJECT Preliminary Proposed Underpinning of Endwall DATE 12/96

BY LF

F&A PROJECT No. 96223

CLIENT PROJECT No.



Proposed Underpinning